

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P. O. Box 272400  
Fort Collins, Colorado 80527-2400

pages: 4

703-872-9318

PATENT APPLICATION

ATTORNEY DOCKET NO. 10991744-4

IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Janice Nickel

Confirmation No.: 8131

Application No.: 09/981,277

Examiner: K. Pierre

Filing Date: 10/17/2001

Group Art Unit: 2822

Title: METHOD OF FABRICATING AN MRAM DEVICE INCLUDING SPIN DEPENDENT  
TUNNELING JUNCTION MEMORY CELLS

COMMISSIONER FOR PATENTS  
Washington, D.C. 20231

FAX COPY RECEIVED

JUN 13 2002

## TRANSMITTAL LETTER FOR RESPONSE/AMENDMENT

Sir:

TECHNOLOGY CENTER 2800

Transmitted herewith is/are the following in the above-identified application:

- (X) Response/Amendment ( ) Petition to extend time to respond  
( ) New fee as calculated below ( ) Supplemental Declaration  
(X) No additional fee (Address envelope to "Box Non-Fee Amendments")  
( ) Other: (fee \$ )

CLAIMS AS AMENDED BY OTHER THAN A SMALL ENTITY						
(1) FOR	(2) CLAIMS REMAINING AFTER AMENDMENT	(3) NUMBER EXTRA	(4) HIGHEST NUMBER PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	(6) RATE	(7) ADDITIONAL FEES
TOTAL CLAIMS		MINUS		= 0	X \$18	\$ 0
INDEP. CLAIMS		MINUS		= 0	X \$84	\$ 0
[ ] FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM					+ \$280	\$ 0
EXTENSION FEE	1ST MONTH \$110.00	2ND MONTH \$400.00	3RD MONTH \$920.00	4TH MONTH \$1440.00		\$ 0
OTHER FEES						\$
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT						\$ 0

Charge \$ 0 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16, 1.17, 1.19, 1.20 and 1.21. A duplicate copy of this sheet is enclosed.

I hereby certify that this paper is being facsimile  
transmitted to the Patent and Trademark Office on  
the date shown below.

Date of Facsimile: 6/13/2002

Typed Name: Hugh P. Gortler

Signature:

Respectfully submitted,

Janice Nickel

By

Hugh P. Gortler

Attorney/Agent for Applicant(s)  
Reg. No. 33,890

Date: 6/13/2 02

Rev 10/01 (TrnAmdFax)

Telephone No.: (949) 454-0898

- Attach as First Page to Transmitted Papers -

#4/Response  
Qtoed  
6/14/02  
PATENT  
PDNO 10991744-4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: : Confirmation No. 8131  
Janice Nickel :  
Serial No. 09/981,277 : Examiner Kenelt Pierre  
Filed: October 17, 2001 : Group Art Unit: 2822  
For: METHOD OF FABRICATING AN MRAM DEVICE INCLUDING SPIN  
DEPENDENT TUNNELING JUNCTION MEMORY CELLS

Box Non Fee Amendment  
Assistant Commissioner for Patents  
Washington, D.C. 20231

FAX COPY RECEIVED

JUN 13 2002

**RESPONSE TO OFFICE ACTION DATED APRIL 1, 2002** TECHNOLOGY CENTER 2800

Claims 12-20 are pending in this application.

Claims 12-20 are rejected.

In the office action dated 1 April 2002, claims 12, 15 and 16 are rejected under 35 USC §102(b) as being anticipated by Gallagher et al., and claims 13, 14, and 17-20 are rejected under 35 USC §103(a) as being unpatentable over Gallagher et al. in view of Inomata et al. These rejections are respectfully traversed for the reasons that follow.

Claim 12 recites an SDT junction of a memory cell for an MRAM device. The junction comprises a bottom ferromagnetic layer, an insulating tunnel barrier atop the bottom ferromagnetic layer; and a top ferromagnetic layer atop the insulating tunnel barrier. The bottom ferromagnetic layer has flattened peaks.

Gallagher et al. also discloses an SDT junction. The structure of Gallagher et al.'s magnetic tunnel junction 8 is described on col. 4, lines 16-25, and

S.N. 09/981,277..... Page 2

fabrication is described in col. 5, lines 49+. However, Gallagher et al. do not teach or suggest that the peaks of a bottom ferromagnetic layer are flattened.

The office action states that the "surface smoothness (Flat peak) of the lower layers is very important to control the MTJ or SDT resistance (a pinpoint cite was not provided). The undersigned has reviewed Gallagher et al. and did not find such a teaching. However, the undersigned did find a passage on col. 6, lines 24+ that discussed MTJ resistance. This passage does not teach or suggest flattened peaks of a bottom ferromagnetic layer.

The undersigned reviewed Inomata et al. and did not see a teaching or suggestion of a bottom ferromagnetic layer having flattened peaks.

Because neither Gallagher et al. or Inomata et al. teaches or suggests a bottom ferromagnetic layer having flattened peaks, claim 12 and its dependent claims 13-16 should be allowed over the Gallagher et al. alone and the combination of Gallagher et al. and Inomata et al.

Claim 17 recites SDT junctions including bottom ferromagnetic layers. Each bottom ferromagnetic layer has an upper surface, and each upper surface has a valley-to-peak height variation of no more than about one nanometer.

Neither Gallagher et al. or Inomata et al. teach or suggest such a valley-to-peak height variation. According to the office action, such a variation is disclosed in a passage on col. 19, lines 60-67 of Inomata et al. It is not. This passage merely states that "grain size may preferably be 1 nm or more so as not to have super-paramagnetism. Grain size refers to the diameter of the grains, not their height.

S.N. 09/981,277..... Page 3

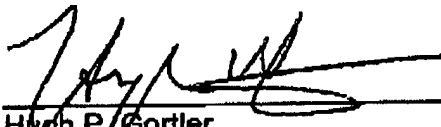
Because neither Gallagher et al. or Inomata et al. teaches or suggests a bottom ferromagnetic layer having a valley-to-peak height variation of about one nanometer, claim 17 and its dependent claims 18-20 should be allowed over the combination of Gallagher et al. and Inomata et al.

The examiner is respectfully requested to withdraw the rejection of claims 12-20, and issue a notice of allowability. If issues remain, the examiner is invited to contact the undersigned to discuss those remaining issues.

Respectfully submitted,

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office on June 13, 2002.

  
Hugh P. Gortler

  
Hugh P. Gortler  
Reg. No. 33,890

Hewlett-Packard Company  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, Colorado 80527-2400

(949) 454-0898

Date: June 13, 2002

FAX COPY RECEIVED  
JUN 13 2002  
TECHNOLOGY CENTER 2800